

ON THE MALE GENITALIA OF THE HESPERIIDAE  
OF NORTH AMERICA

## PAPER II

BY HENRY SKINNER AND R. C. WILLIAMS, JR.

Attention is called to the authors' previous paper on the larger Hesperiidæ.<sup>1</sup>

This paper will treat the remaining species of Hesperinae in America north of Mexico and the West Indies, with the exception of those of the genus *Thanaos*, which have already been reviewed and most of the valvae figured by Seudder and Burgess,<sup>2</sup> Seudder,<sup>3</sup> Skinner,<sup>4</sup> and Lindsey.<sup>5</sup>

We have in general followed the classification adopted by Lindsey.<sup>6</sup> We prefer, however, to keep the genera *Hesperia* and *Helioptetes* separate, for the reason that they are readily differentiated by their superficial appearance, and while *Hesperia* is cosmopolitan, *Helioptetes* seems to be strictly neotropical. We also follow Godman and Salvin and retain *domicella* in *Helioptetes*. There is no indication in the male genitalia that this species is a connecting link between the two genera, and each of these might be divided into a number of groups in which the genitalia are highly specialized along different lines.

We follow Lindsey, however, in retaining a rather mixed lot of species in the genus *Pholisora*. The male genitalia show remarkable differences in species that in other characters appear to be closely allied,<sup>7</sup> so we do not believe it advisable to break up this genus.

Further deviations from the usual nomenclature are noted under the species and the reasons given.

<sup>1</sup> Trans. Amer. Ent. Soc., XLVIII, pp. 109-127, (1922).

<sup>2</sup> Proc. Bost. Soc. Nat. Hist., XIII, pp. 282-306, pl., (1870).

<sup>3</sup> Butterflies of the Eastern U. S. and Canada, (1889).

<sup>4</sup> Trans. Amer. Ent. Soc., XI, pp. 195-221, (1911).

<sup>5</sup> Bull. Lab. Nat. Hist. State Univ. Iowa, IX, (no. 4), pp. 49-55, pl. 2, (1921).

<sup>6</sup> Ibid.

<sup>7</sup> Note *catullus* and *mejicanus*.

The drawings were made from the genitalie mounts by Miss Helen Winchester.

The references under the species refer to previous figures of the male genitalia.

The records given are of insects which we have observed and in the collections of the Academy of Natural Sciences of Philadelphia, the American Entomological Society, and of R. C. Williams, Jr.

All references to genitalia in this paper refer to those of the male insect.

1. **Hesperia centaureae** Rambur (Fig. 1.)

Scudder, Butterflies East. U. S. and Canada, III, pl. 35, fig. 45, (1889).

Reverdin, in Oberthur, Étud. Lep. Comp., XII, pl. cccii, fig. 5202, (1916).

This species has both the costal fold and tibial tuft. American and European specimens are the same genitally.

There is a single, beaked, terminal projection to the uncus; the scaphium is simple with small dentations on the external portion; the valve is of a pattern somewhat similar to that of *ruralis*, but with the central terminal recurved projection long and extended outwardly bayonet-shaped; the aedoeagus is simple.

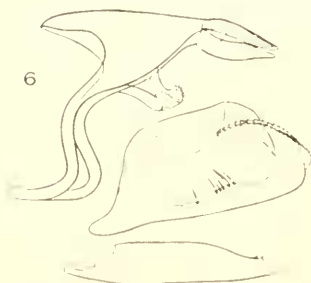
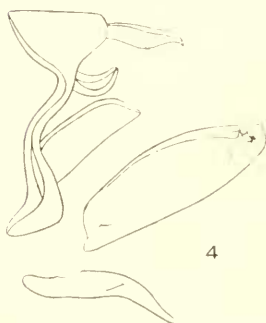
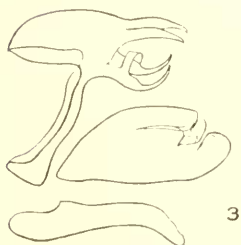
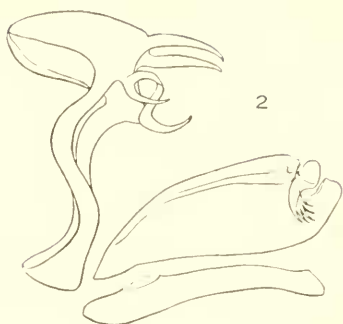
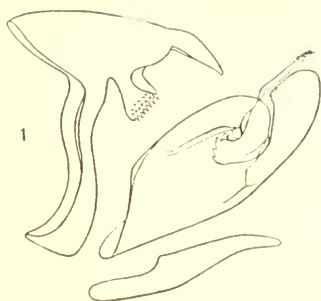
*Records:* NEW JERSEY, Iona, April (Skinner), Great Notch, Essex County; VIRGINIA, Montgomery County, April; COLORADO, Wilson Peak, Hall Valley, August (Osler); ALBERTA, Laggan.

2. **Hesperia ruralis** Boisduval (Fig. 2.)

This species has both costal fold and tibial tuft.

*Ruralis* has a rather large uncus with two stout, well separated, beaked projections above, and two strong hooks below, the latter curving upwards, with a connecting band from base to base curved dorsally. The valve is split at its terminus and the ventral lobe carries a recurved process armed with a number of stout teeth. The aedoeagus is simple.

*Records:* COLORADO, Chimney Gulch, Golden, Bear Creek, Jefferson County (Osler); UTAH, Silver Lake; CALIFORNIA, Albion, May (Sinclair), Santa Cruz, April and May (Dodge), Trinity County, June (Fox), Santa Clara County; WASHINGTON, Port Blakeley, Olympia; OREGON, Fort Klamath, Ashland.



1. *Hesperia centaureae*, Great Notch, Essex County, New Jersey.  
 2. *Hesperia ruralis*, Santa Cruz, California. 3. *Hesperia xanthus*, Jemez Mountains, New Mexico. 4. *Hesperia scriptura*, Trinidad, Colorado.  
 5. *Hesperia philetas*, Baboquivari Mountains, Arizona. 6. *Hesperia syrictus*, Port de Paix, Haiti. (all  $\times 17$ .)

3. **Hesperia xanthus** Edwards (Fig. 3.)

This species has the tibial tuft but no costal fold. It is very like *ruralis* in general appearance and maculation, and the pattern of the genitalia is similar.

The uncus is stout, carrying four hooks; the valve resembles that of *ruralis* except that the stout teeth of the recurved central process at the apex are lacking; the aedoeagus is simple.

*Records:* COLORADO; NEW MEXICO, Jemez Springs, May (Woodgate).

4. **Hesperia macedunnoughi** Oberthür

This name was proposed for a single male specimen (from Arizona ?) figured by Colot, but not described.<sup>8</sup> Another male is figured by Barnes and McDunnough,<sup>9</sup> from Redington, Arizona, and they state that it lacks the costal fold and is closely allied to *xanthus*, but smaller.

The markings of the secondaries below are unlike those of any of the series of *xanthus* and *ruralis* in our collections.

5. **Hesperia scriptura** Boisduval (Fig. 4.)

This species has the tibial tuft but lacks the costal fold.

The uncus carries two long stout divergent beaks; the scaphium is feebly developed; the valve is rounded at the apex, bilobed and carrying a small recurved process bearing fine spines; the aedoeagus carries near the middle a stout tooth. This species has a well developed juxta, like a folded leaf, in which the aedoeagus lies.

*Records:* COLORADO, Trinidad, Chimney Gulch, June (Osler), Poncha Springs; ARIZONA, Prescott; NEW MEXICO, Highrolls (Viereck), Las Cruces.

6. **Hesperia philetas** Edwards (Fig. 5.)

This species has both costal fold and tibial tuft.

It was described from a single female from Western Texas (Boll), as being similar in its markings to *tessellata* above, but distinguished by the secondaries below, which are white with a yellow tint, without the discal band as in *tessellata*, but with a few brown dots and streaks, quite unlike any other American species.

<sup>8</sup> Oberthür, Étud. Lep. Comp., ix, p. 86, pl. cclxiv, fig. 2205, (1913).

<sup>9</sup> Cont. Nat. Hist. Lep. N. A., iii, pl. x, fig. 14, (1916).

The females which we have agree with the description; the males associated with them agree in the markings below, but usually have more white markings above. We have not, however, a male that just agrees with Lindsey's figure.<sup>10</sup>

The genitalia are more like those of *syrichtus* than those of any other American species. The tegumen is similar, ending in two projections; the scaphium with rather heavier serrations; the valve has a recurved hook at its apex, and in addition near and on the dorsal part numerous stout spines directed backward; the aedocagus is simple.

*Records:* TEXAS, San Antonio; ARIZONA, Mt. Graham (Morrison), Baboquivari Mts., Pima County, July (Poling).

7. *Hesperia syrichtus* Fabricius (Fig. 6.)

Godman and Salvin, Biol. Cent. Amer., Rhop., III, pl. 90, fig. 27, (1899).

Reverdin, Bull. Soc. Lep. Genève, IV, pl. 5, figs. 1 (form a), 2 (form b), 3 (form c) and 4, 5, 6 (valvae enlarged), (1919).

This species has both costal fold and tibial tuft.

Dr. J. L. Reverdin, in the paper referred to above (p. 96 and 167), has published the results of his careful study of this species, presented excellent figures of the insect prepared by the artist Colot, photographic reproductions of the male genitalia of three forms, text figures showing variation in the aedocagus, and extensive observations on the forms of the species and its geographic distribution.

The typical form of *syrichtus* is ashen, or black and white on the secondaries below, while the form *montivagus* Reakirt (*fumosa* Reverdin) is decidedly suffused with brown. Both forms occur in Central America, Mexico and the Antilles. We have the typical form from Texas, proving its occurrence in our fauna, but the prevailing form above the Mexican border and in Florida is *montivagus*.

The terminal of the uncus is cleft; the scaphium consists of two arms shagreened at their turned up terminals and connected together with an arch from their bases; the valve has a rounded apex, the dorsal edge produced backward in a curve the outer portion of which is strongly dentate; the aedocagus is provided with some teeth at the apex varying in number and shape.

<sup>10</sup> Univ. of Iowa Studies in Nat. Hist., IX, pl. 1, fig. 7, (1921).

*Record:* near Corpus Christi, southern Texas (Aaron).

There is a third form or perhaps a distinct species (*syrichtides* Reverdin), also occurring in Central America, Mexico and the Antilles, which is very like the typical form in color and maculation but which differs genitally in the shape of the valve, in that the terminal rounded end is not extended so far backwards, but ends in a more substantial projection shaped like the toe of a slipper, and the aedoeagus is provided with a single stout tooth at its terminal. This form or species, however, does not seem to enter the United States.

a. form **montivagus** Reakirt

This was originally described from "Rocky Mountains, Colorado Territory" and is the prevailing form above the Mexican line.

The genitalia are the same as those of typical *syrichtus*.

*Records:* COLORADO; FLORIDA, Key West (Morrison); SOUTHERN ARIZONA (Poling).

8. **Hesperia tessellata** Scudder (Fig. 7.)

Scudder, Butterflies East. U. S. and Can., III, pl. 35, fig. 39 (valve), 40 (uncus) (as *montivagus*), (1889).

Reverdin, Bull. Soc. Lep. Genève, IV, pl. 7, fig. 1 (typical) and 4-8 (details and aberrant formations), (1921).

This species has the costal fold but lacks the tibial tuft.

Reverdin in the paper referred to above (pp. 168-181), has presented lithographic figures of the insect by Colot (Plate 6, figs. 9, 10, 11, 12, 15), sketches of the variation in the valve (p. 177), and published the results of his careful study of its genitalic variation and geographic distribution, from the examination of a large number of specimens.

He concludes that it is a widely spread species, subject to considerable variation in its habitat from Surinam, through Central America, Mexico and throughout the United States, and within these limits divides the species into three classes; first those with a large toothed protuberance at the end of the valve; second, intermediate forms; and third, those which are without this protuberance and teeth. The first class roughly covers the territory to the east and north of the United States; the second, the States adjoining the Mexican boundary and well

up into California; the third, Arizona, Texas and to the South. He places *occidentalis* Skinner as a variety.

*Tessellata* was described by Scudder from Missouri, and has priority over *Hesperia communis* Grote (one male, one female; Central Alabama), the types of which are in the collection of the Academy of Natural Sciences of Philadelphia, and are so labelled in the handwriting of A. R. Grote. *Communis* is a synonym of *tessellata*.

The uncus is split at its apex; the scaphium is peculiar in that from its middle there projects inwardly a T-shaped process; the valve is rounded at its extremity and carries a process turned inwardly and upwardly ending usually with a double tooth, beyond which there is a long cylindrical arm extending inwardly almost the length of the valve, and with its end strongly denticulate; the aedoeagus is simple.

a. var. ***occidentalis*** Skinner (Fig. 8.)

Biol. Cent.-Amer., Rhop., pl. 90, fig. 30, (1899) (as *montivaga*).

This was originally described as a species,<sup>11</sup> as "smaller and generally whiter—than *tessellata*—found in the Northwest territory and in the Southwest generally." The same year *occidentalis*, *tessellata* and *syrictus* were figured by the author and comparisons made.<sup>12</sup>

We now select from the type material a male from San Antonio, Texas, as the single type. It is like the figured specimens referred to above. Some paratypes, from Ysleta, Texas, April, are still smaller and whiter, and a specimen from the Northwest territory, figured by Reverdin<sup>13</sup> has the ground color still further eneroached upon by the white markings. This last, however, cannot be considered typical of *occidentalis*, but an aberration of *tessellata*. The specimen figured by Reverdin as *occidentalis*<sup>14</sup> is darker and larger than any in the type lot.

The name should be restricted to apply only to the smaller, paler form of the species inhabiting the low arid regions along

<sup>11</sup> Ent. News., xvii, p. 96, (1906).

<sup>12</sup> L. c., p. 277, pl. xii.

<sup>13</sup> Bull. Soc. Lep. Genève, iv, pl. 6, fig. 9, (1919).

<sup>14</sup> L. c., fig. 11.

the Rio Grande to the north and south, and thence to and up the Californian coast.

The genitalia of *occidentalis* are the same as those of *tessellata* except that the valve lacks the toothed projection.

*Records:* TEXAS, Ysleta, El Paso, Corpus Christi, Round Mountain; ARIZONA, Tucson; NEW MEXICO, Highrolls, Alamo-gordo; CALIFORNIA, La Jolla, November (Williams), Dobel.

9. ***Helioptetes domicella*** Erichson (Fig. 9.)

This species has the costal fold and tibial tuft.

The tegumen is provided with a long uncus, ending in a large truncate projection densely covered with hairs projecting backwards; the scaphium is shagreened at its apex; the valve is split at its terminus, the dorsal lobe rounded and the ventral lobe larger, convolute, and serrate on the caudal margin; the aedocagus is simple.

The tegumen is quite unlike that of any of the species of *Hesperia* or any other species of *Helioptetes* that we have examined.

*Records:* ARIZONA, Tucson; MEXICO, Colima; ARGENTINE REPUBLIC, La Rioja.

10. ***Helioptetes ericetorum*** Boisduval (Fig. 10.)

This species has the costal fold and tibial tuft.

The type has been admirably figured by Oberthür<sup>15</sup> and Lindsey has figured both sexes.<sup>16</sup>

The uncus ends in split slender beaked processes; the scaphium is present and in addition the girdle of the tegumen is expanded outwardly on each side, bearing below the scaphium substantial projecting arms dentate at their outer ends. The valve is split at the terminus, the ventral portion hooked and with small teeth at the end; the aedocagus is simple.

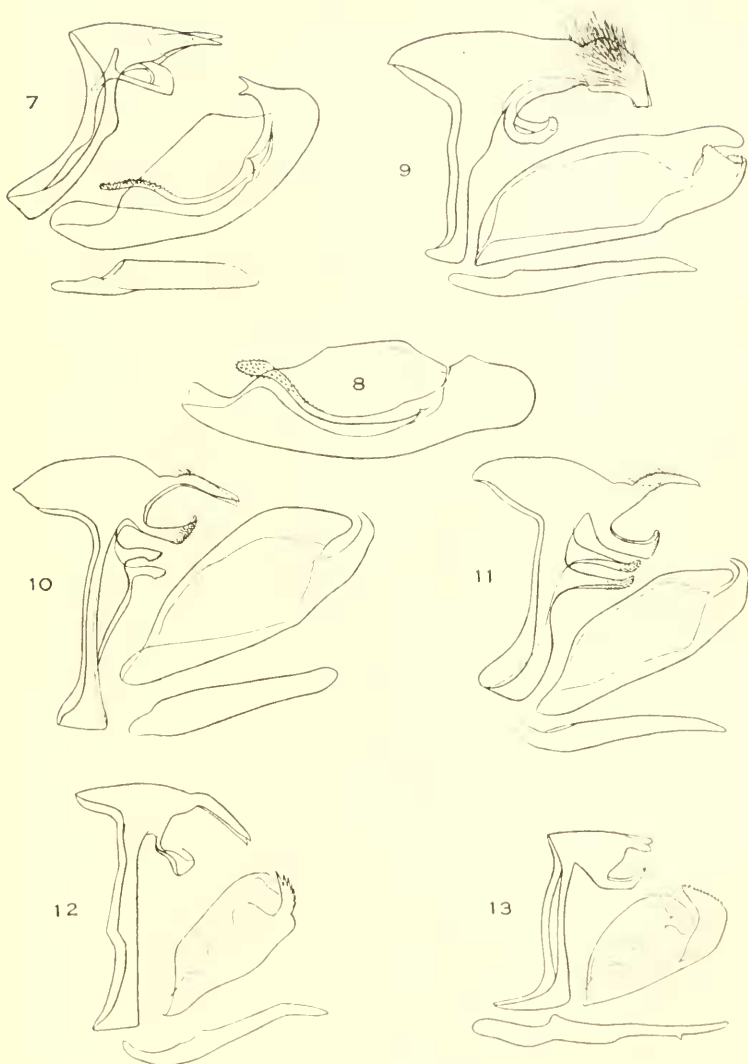
*Records:* OREGON; CALIFORNIA, Los Angeles, Riverside, Havilah, Mt. Pinos, Ventura County, September (Rehn and Hebard); ARIZONA, Mt. Graham.

11. ***Helioptetes laviana*** Hewitson (Fig. 11.)

This species has the costal fold and tibial tuft. It enters our fauna in Texas, from whence it extends south well into South America.

<sup>15</sup> Étud. Lep. Comp., vi, pl. 137, fig. 1210, (1912).

<sup>16</sup> Univ. Iowa Studies in Nat. Hist., ix, pl. 1, figs. 4 and 6, (1921).



7. *Hesperia tessellata*, Dakota. 8. *H. tessellata* race *occidentalis*, Tucson, Arizona. 9. *Helioptes domicella*, La Rioja, Argentine Republic. 10. *Helioptes cricclorum*, Southern California. 11. *Helioptes laviana*, Chapada, Brazil. 12. *Helioptes macaira*, Corpus Christi, Texas. 13. *Celotes nesusus*, Corpus Christi, Texas. (all  $\times 16$ .)

The genitalia are of the same general pattern as those of *ericetorum*, the arms projecting from the sides of the girdle are, however, about twice as long.

*Records:* MEXICO, Colima, Yucatan; BRAZIL, Chapada; PARAGUAY, Villa Rica.

12. ***Heliopetes macaira*** Reakirt (Fig. 12.)

This species has the costal fold and tibial tuft. It enters our territory in Texas and extends south through Mexico and Central America.

Our Texan and Mexican material shows considerable variation in the amount of brown eneroaching on the white ground. Above, some specimens are immaculate on the secondaries (*oceanus* Edwards), in others there is considerable blackish brown at the ends of the veins and even along the entire margin. Below we have a condition ranging from small brown spots and broken terminal band, to brown color covering almost the entire surface of the secondaries. The pattern, however, is the same with varying insistence.

Godman and Salvin rather suggest that *nivella* may be but a varietal form of *macaira*, and our observations lead us to believe that such is the case. The genitalia of the two forms are the same.

There is a great variation in the amount of the brown-black markings in the allied species *alana*, *arsalte* and *laviana*, of which we have long series from Central America and Mexico, and an analogy is found in an unidentified species, very closely allied, from southern Brazil, which shows a similar variation equally great.

The principal differences we recognize to separate the typical form from its variety is to be found in the maculation of the secondaries. *Macaira* is described as immaculate above and with a broad brown band extending across the outer border below, while *nivella* is described as with blackish brown on the border above and with two patches on the under side at the outer border.

We accept the synonymy as given by Godman and Salvin, who were in a position to have access to types and authentic material.

*Macaira* is figured by Hewitson<sup>17</sup> as *locutia* Hewitson from the Island of Taboga, Panama.

The uncus is proportionately smaller than that of the two preceding species, its projecting beaks are similar, but this species lacks the arms projecting from the sides of the girdle. The valve carries at its apex on the ventral lobe a stoutly thorned process; the aedoeagus is simple.

*Records:* TEXAS, Corpus Christi (Aaron); MEXICO, Mazatlan, Colima, Sonora.

a. var. **nivella** Mabilie

Biol. Cent.-Amer., Rhopal., pl. 90, fig. 24, (1899).

This insect is reported from Brownsville, Texas, as is also typical *macaira*. It is well figured by Godman and Salvin<sup>18</sup>, who state, as we find to be the case, that the genitalia are the same as those of *macaira*.

*Records:* MEXICO, La Joya, Colima, Yucatan.

13. **Celotes nesus** Edwards (Fig. 13.)

Biol. Cent.-Amer., Rhopalocera, pl. 91, fig. 29, (1899).

This species has the costal fold and tibial tuft.

Lindsey places it in the genus *Systascea* with *pulverulenta*. It has, however, a very different appearance, and the genitalia also differ so decidedly that this association can hardly hold. Its near allies are of the genus *Carcharodus*, but a comparison of the genitalia with those of *malvarum* Hoffmannsegg (= *alcae* Esper), with which it was associated by Strecker when he described *notabilis* (= *nessus*), does not disclose a sufficient similarity to necessitate its transference to *Carcharodus*, and we therefore place it in *Celotes*, which Godman and Salvin erected for it.

The uncus is short with split terminals; the scaphium prominent and set well up on the uncus; the saecus is produced into the abdomen more than in other species of the allied groups; the ventral lobe of the valve, extended beyond the dorsal lobe is serrate on its recurved outer margin; the aedoeagus is relatively large and long and bears a tooth near its apex.

<sup>17</sup> Exot. Butt., v, Leucochitonea II, figs. 19 and 20, (1875).

<sup>18</sup> Supra, pl. 90, figs. 22 and 23.

*Records:* TEXAS, Corpus Christi (Aaron), New Braunfels, Round Mountain, San Antonio, Kerrville; ARIZONA, Baboquivari Mts., Pima County (Poling); NEW MEXICO, Alamogordo; MEXICO, Sonora.

14. ***Pholisora catullus*** Fabricius (Fig. 14.)

Scudder, *Butterflies*, pl. 35, figs. 41 (valve), 42 (uncus), 43 (tip of uncus), (1889).

None of the species of *Pholisora* in our fauna has the tibial tuft. This species has the costal fold.

The uncus ends in a single projection with three terminal beaks, at the base of which the uncus is divided, showing two lobes; the scaphium is strongly chitinous with some shagreenation at the apical surface; the lobes of the valve are rounded at the end, the ventral dentate outwardly and bearing a stout incurved spine, set just before the apex; the aedoeagus is remarkable in that at its apex there is a strong recurved hook on the dorsal side, it also carries some internal hair-like spines.

15. ***Pholisora mejicanus*** Reakirt (Fig. 15.)

Biol. Cent.-Amer., Rhopalocera, pl. 90, fig. 12 (as *mexicana*), (1897).

This species has the costal fold. It is very like *catullus* above, but the secondaries below have a purplish tint and the veins are conspicuous in a darker fuscous color. It is a Mexican species occasionally taken across the border. Mr. William Schaus kindly sent us some specimens from Jalapa and Oaxaca, Mexico, for study.

The uncus is stout and long, ending in a single claw, short, and broad at its base; the scaphium is hardly present; the valve appears truncate, the ventral lobe sharply rounded and bent up and back terminating in a point, the outer margin finely denticulate, overlapping the rounded costal lobe; the aedoeagus is simple, doubly bent.

16. ***Pholisora alpheus*** Edwards (Fig. 16.)

Biol. Cent.-Amer., Rhopalocera, pl. 90, fig. 15, (1897).

This species lacks the costal fold.

The uncus is stout, terminating in a cylindrical projection with a blunt end; the scaphium is well developed and with dentations on the central super-apical surface; the valve is relatively

small, simple, and terminating in a long bayonet, turned upwardly; the aedoeagus is peculiar in that its base is T-shaped, in nature set in a horizontal plane.

*Records:* ARIZONA, Mt. Graham (Morrison), Gadsden (Schiffel), Florence (Biederman); NEW MEXICO, Alamogordo, April, May (Viereck and Rehn), Las Cruces.

17. **Pholisora arizonensis** Mabille & Boulet

Under the name *Hesperopsis arizonensis* these authors have described an insect in a recent paper.<sup>19</sup> A free translation of the original French description follows.

"Four wings black with a long brown fringe cut into here and there with yellow. Primaries above with two apical points and two other points not so distinct placed obliquely in three and four; a terminal row of clear (pale) points on the external border; some appearance of yellowish scales on the disc. Secondaries above of a uniform black with a terminal row of clear points hardly visible, and an indistinct dash in the cellule. Primaries below uniform black brown with two well marked apical points, some white hatching along the costa above the apical points, one perceives the two points on three and four and the terminal row of clear points. Secondaries below; on the brown-black ground is easily seen the terminal row of clear points and a sickle-shaped trace in the cellule. Palpi white; at the base of the antennae a little tuft of white hairs.

Arizona, U. S., one ♂: Boulet Collection, Paris Museum."

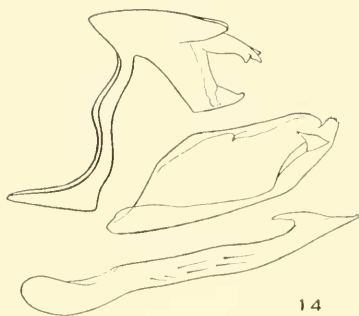
We think this is *alphens*.

18. **Pholisora libya** Scudder (Fig. 17.)

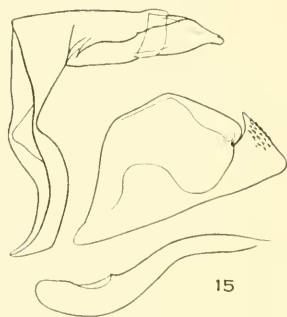
This species lacks the costal fold. *Libya* varies greatly in the number of white spots on the wings, both above and below. *Lena* of Edwards appears to be the same species as *libya*, described from specimens having few spots on the primaries above and one spot on the secondaries below. The genitalia of *libya* and of the one spotted form (*lena*) are alike.

The type information of *libya* is, one male, two females, "Beaver Dam," April 20-28, Arizona (25 miles to west of south of St. George, Utah). The type information of *lena* is, one male, one female, Montana. We have specimens of this from the White River, Colorado.

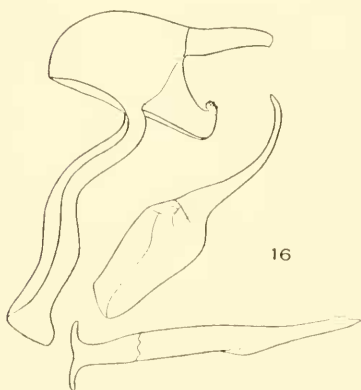
<sup>19</sup> Bull. Soc. Ent. France, 1917, p. 100.



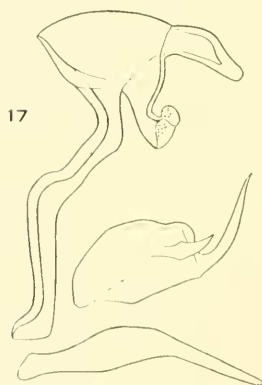
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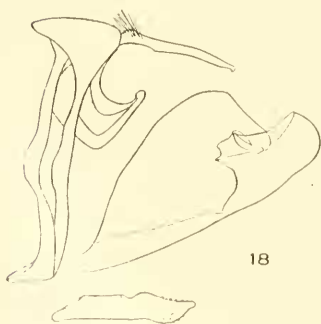
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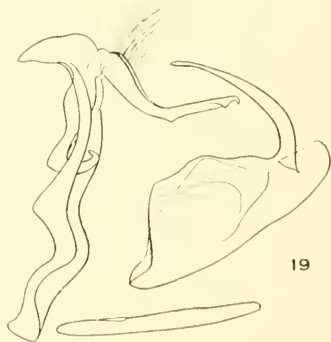
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14. *Pholisora catullus*, San Antonio, Texas. ( $\times 20$ .) 15. *Pholisora mejicanus*, Oaxaca, Mexico. ( $\times 20$ .) 16. *Pholisora alpheus*, Gadsden, Arizona. ( $\times 30$ .) 17. *Pholisora libya*, Florence, Arizona. ( $\times 30$ .) 18. *Pholisora ceos*, Mount Graham, Arizona. ( $\times 20$ .) 19. *Pholisora hayhurstii*, Quincy, Illinois. ( $\times 20$ .)

The uncus ends in a cylindrical blunt process; the scaphium is well developed, ending in a double lobe, well dentated; the valve is not split apically but carries from the ventral side a long sickle-shaped process, curved upwards, and from the center another stout process shaped like a spear head; the aedoeagus is simple but swollen in its median area.

*Records:* ARIZONA, Florence, September (Biederman); UTAH, Stockton, July (Spalding); NEVADA, Beatty, August (Rehn and Hebard), Humboldt Lake; CALIFORNIA, San Diego County (Coquillett), Indian Wells, September (Coolidge), San Bernardino (Wright), Coalinga, Fresno County, August (Rehn and Hebard), Lancaster.

19. **Pholisora ceos** Edwards (Fig. 18.)

Biol. Cent.-Amer., Rhopalocera, pl. 89, fig. 8, (1896).

This species has the costal fold. It is readily distinguished from the other species of our fauna by the orange color of the hair of the head and palpi above.

There is a long, slender, jointed projection from the uncus; the scaphium is present, long and slender; the valve has the ventral lobe projecting, rounded and set with short hairs, the dorsal lobe is wide, rounded; the aedoeagus is very short, the apical portion swollen and bearing numerous small teeth.

*Records:* ARIZONA, Mt. Graham (Morrison), Tucson; MEXICO, Sonora (Morrison).

20. **Pholisora hayhurstii** Edwards (Fig. 19.)

Biol. Cent.-Amer., Rhopalocera, pl. 89, fig. 16, (1896).

This species has the costal fold.

The uncus has a peculiar terminal, bent downwards in the middle, long and ending in a well developed beak, there is a tuft of hairs directed upwards, at the base of this projection; the scaphium is long, almost like a second girdle, extending down almost to the center of the tegumen; the valve has a rounded ventral lobe but dorsally carries a long rod curved inwardly; the aedoeagus is simple.

*Records:* TEXAS, San Antonio, Round Mountain; FLORIDA, Miami, June (Hebard).

21. **Pholisora ascalaphus** Staudinger (Fig. 20.)

Biol. Cent.-Amer., Rhopalocera, pl. 89, fig. 14, (1896).

This species has the costal fold.

It was described as *Helius ascalaphus* by Staudinger<sup>20</sup> from Chiriqui, Panama. It is figured by Godman and Salvin,<sup>21</sup> who state that "it is a very common insect all over Central America and southern Mexico up to an elevation of 4000 or 5000 feet above sea level.—In outward appearance *S[taphylus] ascalaphus* is very like the North American *S. hayhursti*, both having a similarly shaped outer margin to the secondaries. *S. hayhursti* is a little paler in colour, the faint marking of the wings rather more plainly shown, and the palpi purer white beneath."

We have a small series of both sexes of this species from near Corpus Christi, Texas (Aaron), which have been in the Academy Collection over the *hayhursti* label since 1884.

The tegumen is similar to that of *hayhursti*; the uncus carries a similar projecting process bent sharply downward and then up, ending in a hook, and bearing a tuft of hairs at its base; the valve is rounded at its apical end, in and on which it bears numerous stout spines directed upwards; the aedocagus is simple.

22. **Pholisora brennus** Godman and Salvin<sup>22</sup> (Fig. 21.)

Biol. Cent.-Amer., Rhopalocera, pl. 89, fig. 23, (1896).

This species has the costal fold. *Staphylus brennus* Godman and Salvin<sup>23</sup> was described from two specimens from Chiriqui, Panama, which were received from Staudinger with the manuscript name *brennus* Mabille. We have had specimens from the Skinner Collection, in the Academy Collection for many years, marked *brennus*, Chiriqui, Staudinger, which now turn out to be *imbras*, so the identification of the insects of the Runyon catch, not now available, is doubtful, and the southern species which crosses the Mexican boundary may be *brennus* or *imbras*.

<sup>20</sup> Verh. Zool.-bot. Gesell. Wien, xxv, p. 116, (1876).

<sup>21</sup> Biol. Cent.-Amer., Rhopalocera, p. 432, pl. 89, figs. 13, 14 ♂, 15 ♀, (1897).

A free translation of the original description of *brennus* follows:

"Wings fuscous-brown almost immaculate; sparsely scattered with yellow scales; anteriors with a hardly paler submarginal band, without hyaline spots; palpi below with blackish and yellow scales intermixed with the long vestiture."

The insect was not figured, but the name is fixed by the description and the figure of the genitalia. We figure the genitalia of both *brennus* and *imbras*.

The uncus of *brennus* ends in a single slender projection, and itself is incised on each side; the scaphium is scarcely developed; the ventral lobe of the valve terminates in a cordate section overlapping the ventral portion, rounded apically and serrate on its outer ridge; the aedoeagus is slender, carrying internally a few small spines.

*Record:* MEXICO, Texola, Vera Cruz.

23. *Systasea pulverulenta* Felder (Fig. 23.)

This species has the costal fold. A fluted or incised margin to the secondaries is characteristic of the genus.

<sup>22</sup> 22a. *Pholisora imbras* Godman and Salvin (Fig. 22.).

Biol. Cent.-Amer. Rhopalocera, pl. 89, fig. 28, (1896).

This species has the costal fold.

*Staphylus imbras* was described by Godman and Salvin, (Biol. Cent.-Amer., Rhopalocera, p. 435, pl. 89, figs. 27 [♂] 29 [♀], (1897)), from a considerable series from Mexico and Guatemala, the type presumably from Misantla, Mexico (first named locality). A free translation of the original Latin description follows.

"Wings deeply fuscous-brown with an obscure band hardly noticeable; anteriors without subapical hyaline spots (♂); palpi below ochraceous yellow scales intermixed with blackish.

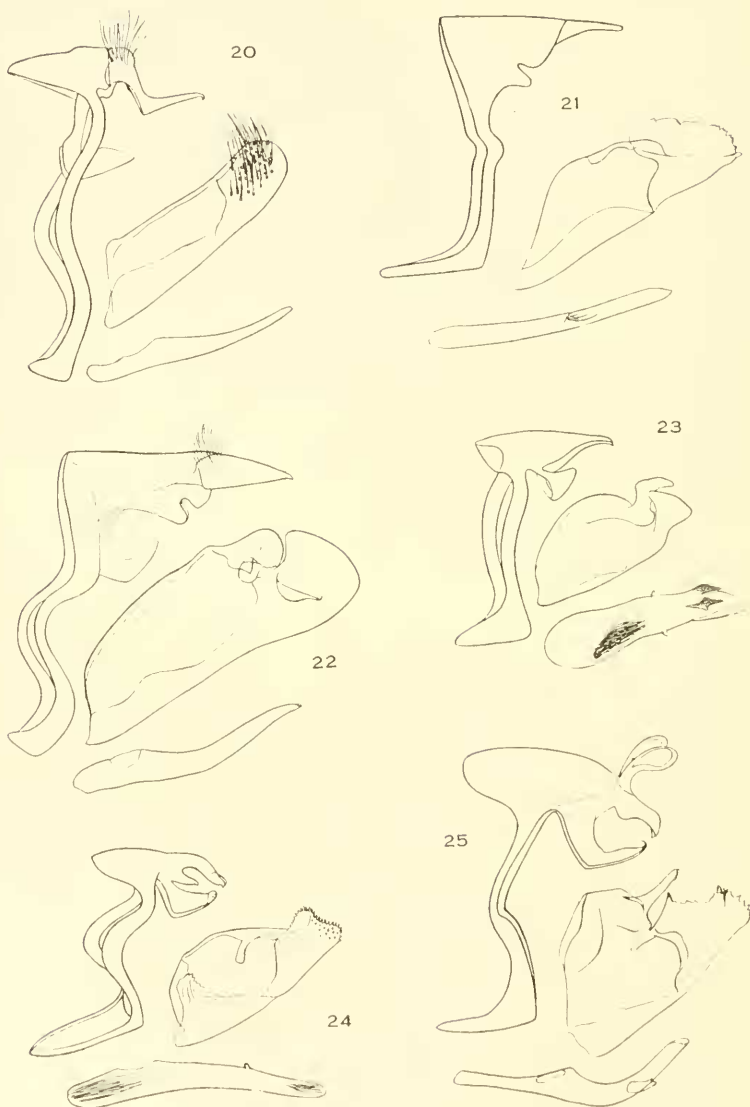
"♀ similar, but larger, the obscure band larger, obvious and anteriorly supplied with three subapical hyaline spots."

They further state it is exceedingly like *brennus*, but has rather less prominent joints to the palpi. Our specimens further show a greater expanse for *imbras* namely, 16 mm., from thorax to apex of wing against 1.1 mm. for *brennus*, *hayhurstii* and *ascalaphus*.

The uncus ends in a stout bulbous process, there are incisions on each side of the uncus; the ventral lobe of the valve, rounded apically, projects beyond the discal lobe and where they meet the chitin of both is convoluted; the aedoeagus is simple, somewhat bent in the middle.

*Records:* PANAMA, Gatun, Canal Zone (Harrower), Chiriqui; GUATEMALA, Quirigua (Rhoads).

<sup>23</sup> Biol. Cent.-Amer., Rhopalocera, p. 434.



20. *Pholisora ascalaphus*, Corpus Christi, Texas. ( $\times 20$ .) 21. *Pholisora brennus*, Texola, Mexico. ( $\times 20$ .) 22. *Pholisora imbras*, Quirigua, Guatemala. ( $\times 20$ .) 23. *Systasca pulverulenta*, Corpus Christi, Texas. ( $\times 15$ .) 24. *Xenophanes tryxus*, Colima, Mexico. ( $\times 15$ .) 25. *Eantis thraso*, Chapada, Brazil. ( $\times 15$ .)

The uncus is cleft and a substantial scaphium is present at its base; the valve ends in two somewhat complicated spatulate projections; the aedoeagus in remarkable is that it carries internally a sponge-like bristling mass, and just before the apical end there are two stout projections of the shape of a bird's head. The congeneric species *erosa* Hübner has a similar aedoeagus, containing the hairy mass and provided with a pair of stout hooked spines near the apex.

*Records:* TEXAS, Corpus Christi (Aaron), San Antonio; NEW MEXICO, Alamogordo, May (Viereck and Rehn); MEXICO, Sonora (Morrison).

24. ***Xenophanes tryxus*** Cramer (Fig. 24.)

Biol. Cent.-Amer., Rhopalocera, pl. 85, fig. 18, (1895).

This species has neither costal fold nor tibial tuft. From South America, through Central America and Mexico, it enters our territory in Texas. Lindsey gives a figure of the male in his paper.<sup>24</sup>

The uncus bears a terminal projection split at the apex, and at the base bearing short lobes; the scaphium is well developed, carrying two apical shagreened lobes; the saccus is broad and extends well into the abdomen; the valve appears to be truncate, the apical margin serrate and bent in two planes, the ventral part carries a rounded, shagreened internal process near the base, and the dorsal part a more slender denticulated lobe medianally; the aedoeagus contains a tuft of hairs at the base and some near the apex.

25. ***Eantis thraso*** Hübner (Fig. 25.)

Biol. Cent.-Amer., Rhopalocera, pl. 87, fig. 7, (1895).

This species has neither costal fold nor tibial tuft. It is a southern species entering our territory in Texas. In this genus the primaries are pointed at the apex and just below there is a slight excavation on the outer margin. Lindsey gives a figure of the male.<sup>25</sup>

The uncus is well developed, carrying a stout blunt beak, and at the base of this a prominent pair of upright processes like rabbit-ears. These ears seem to be characteristic of the genus.

<sup>24</sup> Pl. I, fig. 3.

<sup>25</sup> Pl. I, fig. 8.

The scaphium is well developed; the ventral lobe of the valve ends in a serrate, truncate pocket with some stout teeth; the dorsal lobe carries a rod with fine teeth at its apex; the aedoeagus is bent sharply upwards beyond the middle and carries a strong tooth with several points.

*Records:* TEXAS, Corpus Christi (Aaron); MEXICO, Alta Mira, Tamaulipas, October; BRAZIL, Chapada.

26. **Ephyriades brunnea** Herrich-Schaeffer (Fig. 26.)

This species has the costal fold but lacks the tibial tuft.

It is a West Indian species, reported from Sugar Loaf Key, Florida. R. C. Williams caught a female in Miami, Florida, February 25, 1913. The male is figured by Lindsey.<sup>26</sup> Our female has nine hyaline spots on the primaries, seven of which correspond to those on the male of *brunnea*, and in addition, one minute one on the costa and, one, a streak, below the cell. There are two bands and a basal spot on the primaries of a violet tinge, and an indistinct band, lighter than the brown ground color, on the secondaries.

We have quite a series of *brunnea* males, and the females associated with them from localities in the records given below. We believe the identification is correct, but attention is called to the fact that it is difficult to separate these females from those which have been ascribed to *arcas* Drury (*flyas* Cramer, *relasquez* Lucas) i. e. *otreus* Cramer (*zephodes* Hübner).

Gundlach<sup>27</sup> separates the females by the size of the hyaline spots, stating that those of *arcas* are larger and that the lower or sub-cellular one in *brunnea* is a line, and in *arcas* is triangular or subquadrate. He further states that he had the originals of *zephodes* Hübner, and observed females of this form in coitus with *brunnea* in Cuba, and his friend Klug observed the same in Porto Rico.

The Cramer figures of *flyas* and *otreus* appear on the same plate, and the habitat in each case is given as Surinam,—circumstantial evidence that they may have come from the same catch and may be male and female of one species.

There are intergradations, however, in our own series, so, against this hypothesis that *brunnea* and *arcas*, two very distinct

<sup>26</sup> Pl. I, fig. 10.

<sup>27</sup> Cont. Ent. Cuba, p. 142, (1881).

males, have females which are very similar and only separable in their extreme forms or by association, is the possibility that all the females mentioned above belong to *brunnea*, and that the female of *arcas* is as yet not discovered or, if described, not properly assigned.

In his paper on the Lepidoptera of the Isle of Pines, Holland<sup>28</sup> calls the species *otrcus* with *brunnea* as a variety. According to our hypothesis *brunnea* male is represented by his figure 5; female by figure 4, and figure 3 might be the female of *arcas*. He had two males of *arcas* but associated no female with it.

*Electra* Lintner<sup>29</sup> is also the female of *brunnea* or *arcas*, probably the former, arriving at Hamilton, Ontario, from the tropics on fruit, as Skinner suggests.<sup>30</sup>

*Brunnea* and *arcas* we believe to be congeneric, and a comparison of the genitalia confirms this conclusion. The latter species has, in addition to the costal fold, a tibial tuft, but we do not believe that this difference is of generic importance. We therefore adopt the earliest generic name *Ephyriades* Hübner,<sup>31</sup> of which *otrcus* is the first named species, designated by Seudder<sup>32</sup> as the type.

The pattern of the hyaline spots indicates relationship with *Cogia*, and the asymmetric valvae connects them with *Thanaos*.

The tegumen is peculiar and complicated; it lacks the hood or bonnet of our previously treated hesperiids. The girdle, produced laterally, extends above the uncus, which with its projecting processes extends downwards almost into the girdle. The right valve is broad and rounded outwardly, carrying at the apex a spatulate spined arm; the left valve is narrow, long and tapering from the base to the apex, ending in a blunt rod. The aedoeagus is bent in the middle where it carries a broad dorsal lobe.

*Records:* CUBA, ♂, ♀ (Poey Collection), ♂, Guantanamo, August, April, ♀, August (Ramsden); HAITI, ♂ (Abbott).

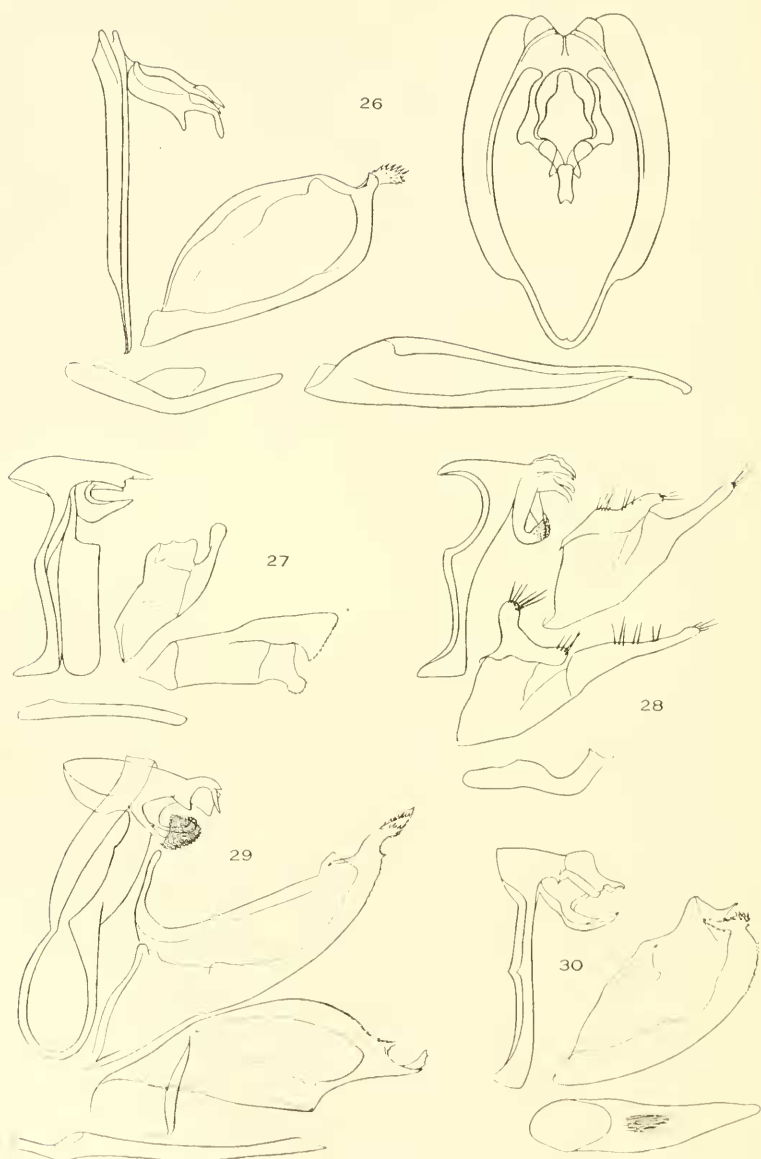
<sup>28</sup> Ann. Carnegie Mus., x, p. 501, pl. 31, figs. 3, 4, and 5, (1916).

<sup>29</sup> Can. Ent., xiii, p. 63, (1881).

<sup>30</sup> Trans. Amer. Ent. Soc., xxxvii, p. 208, (1911).

<sup>31</sup> Verz. bek. Schmett., p. 111, (1816).

<sup>32</sup> Proc. Amer. Acad. Arts and Sci., x, p. 161, (1875).



26. *Ephyriades brunnea*, Guantanamo, Cuba. 27. *Chiomara asychis*, Corumbá, Brazil. 28. *Thanaos gesta*, Haiti. 29. *Timochares ruptifasciatus*, Northern Mexico? 30. *Grais stigmaticus*, Chapada, Brazil. (all  $\times 14$ .)

**27. *Chiomara asychis* Cramer** (Fig. 27.)

Biol. Cent.-Amer., Rhopalocera, pl. 91, fig. 3, (1899).

This species lacks the costal fold. It is another South and Central American species, crossing the Mexican border into Texas and Arizona.

The valvae are asymmetric and very like those of the genus *Thanaos*. The uncus ends in a short beak; the scaphium is well developed, set with very fine short hairs outwardly; the girdle of the tegumen is not symmetrical, the left side being extended to meet the shorter valve; the right valve ends ventrally in a spatulate projection extending beyond the dorsal lobe, the latter having a fluted outer margin; the left valve ends ventrally in a triangular lobe serrate on the caudal margin, and projecting beyond the dorsal lobe, the latter ending in a projection with a round serrate outer margin; the aedocagus is simple.

**28. *Thanaos gesta* Herrich-Schaeffer** (Fig. 28.)

Biol. Cent.-Amer., Rhopalocera, pl. 91, fig. 9, (1899).

This species is without the costal fold. It is from the West Indies, Central America and Mexico, crossing the border into Texas and Arizona. We believe Lindsey to be correct in placing it in the genus *Thanaos*.

The uncus ends in a pair of hooks, the dorsal ridges of which are serrate and also bear some small spines, at the base of these there projects a second pair of smooth beaks; the scaphium is developed and denticulate outwardly; the right valve ends ventrally in a long slender rod and dorsally in a single rounded projection; the left valve ends ventrally in a long tapering rod and dorsally in a double rounded lobe at right angles to the axis; both valves have their dorsal and apical areas set with sharp spines; the aedocagus is simple but sharply curved up near its apex.

**29. *Timochares ruptifasciatus* Plotz** (Fig. 29.)

Biol. Cent.-Amer., Rhopalocera, pl. 88, fig. 3, (1896).

This species has both costal fold and tibial tuft.

It is from Mexico, and there is a pair from the Runyon catch, southwestern Arizona or southeastern California, in the Academy Collection.

The species is like *trifasciatus* Hewitson, and it is possible that it is but a form of that species, though Godman and Salvin consider it to be distinct.

They state there is a pale and a dark form of *trifasciatus* flying together at the same time of year in tolerably equal numbers. Hewitson described one of the former and Godman and Salvin figure one of the latter.<sup>33</sup>

Our limited series shows the dark form from Paraguay and Brazil, and the pale form from Mexico and Cuba.

*Ruptifasciatus* is similar, but the distinct oblique bands of the primaries of *trifasciatus* are in this species or form replaced by indistinct and rather irregular macular bands, and those of the secondaries are broken up into spots.

The Godman and Salvin figure of the genitalia agrees with that of our specimens of *trifasciatus*. We figure a *ruptifasciatus* presumably from northern Mexico, and agreeing with the Runyon pair.

The tegumen is asymmetric, the hooded portion somewhat different on the two sides; the scaphium well developed on the left side is only a linear arm on the right; the sides of the girdle are not of the same width; the saccus is a mere ring; the right valve ends in a fan-shaped process one side of which is bent at right angles to the other in nature, and there is a conspicuous rod at the base (this rod spatulate in our examples of *trifasciatus*); the left valve ends in a process different from that of the right valve and the rounded ventral outer margin is slightly dentate (strongly serrate in *trifasciatus*); the aedocagus is simple, long and slender.

30. **Grais stigmaticus** Mabille (Fig. 30.)

Biol. Cent.-Amer., Rhopalocera, pl. 85, fig. 26, (1894).

This species lacks the costal fold. It is a tropical type, crossing the border into Texas.

The uncus ends in a single beak, broad, swollen above, lobed on the sides below, and bearing a tooth on each side at the base; the scaphium is well developed, smooth; the aedocagus carries a sponge-like mass of hairs.

<sup>33</sup> Pl. 88, figs. 1 and 2.